

WHAT IS CLAIMED IS:

1. A communication network comprising:

a master device and a plurality of slave devices connected to each other through at least one unit of multiplexer in a tree form with the master device at the vertex for transmitting and receiving various types of specific information having a fixed length to and from the devices each other; wherein

said master device specifies any of the slave devices via the multiplexer according to a round-robin, and then

the specified slave device transmits the specific information for starting used for matching the sampling time in said master device and executes specific computing according to the specified information for returning returned from said master device according to the specific information for starting.

2. The communication network according to Claim 1; wherein each of said slave devices and said master device transmits a general information sampled at each of the matched sampling timing and having a fixed length in addition to the specific information for starting and specific information for returning at a predetermined cycle.

3. The communication network according to Claim 2; wherein said multiplexer comprises:

a master-side port for connecting said master device

thereto and slave-side ports for connecting the plurality of slave devices thereto for mutual communication;

a master-destined general information receiving unit for receiving the general information from said slave-side ports;

5 a master-destined specific information receiving unit for receiving the specific information for starting from each of said slave-side ports and managing the specific information in batch;

10 a slave-destined broadcasting bus for broadcasting information obtained from said master-side port to all of said slave-side ports;

15 a master-destined information selecting unit for selecting any one of said mater-destined general information receiving units or said master-destined specific information receiving unit and allowing output to said master device according to a prespecified method; and

a master-destined information multiplexing bus for outputting the information allowed by said master-destined information selecting unit to said master-side port.

20 4. The communication network according to Claim 3 wherein said master-destined information selecting unit

allows output from said master-destined general information receiving unit according to a round-robin when the specific information is not received from said slave-side port;

25 inhibits outputs of the specific information for a

specified period of time decided by a time required for transmitting the information with a fixed length after start of input into said master-destined specific information receiving unit when the specific information is received from any of said slave-side ports; and further

inhibits new output from said master-destined general information receiving unit for the specified period of time and allows output from said master-destined specific information receiving unit after passage of the specified period of time.

5. The communication network according to Claim 3; wherein each of said master device and said slave device comprises:

a general information transreceiving unit for transmitting or receiving the general information;

a specific information transreceiving unit for transmitting or receiving the specific information;

a transmission selecting unit for selecting any one of said general information transreceiving unit or said specific information transreceiving unit and allowing output therefrom

according to a prespecified method; and

executes communications with said multiplexer to which it is connected via a transreceiving port.

6. The communication network according to Claim 5; wherein said transmission selecting unit

allows output from said general information transreceiving unit when a specific information sending request has not been received from said specific information transreceiving unit;

inhibits output from said specific information transreceiving unit only for a specified period of time required for transmission of the information with a fixed length after the request is received when the specific information sending request has been received from said specific information transreceiving unit; and further

inhibits new output from said general information transreceiving unit for the specified period of time and then allows output from said specific information transreceiving unit after passage of the specified period of time.

7. The communication network according to Claim 3; wherein said multiplexer unit comprises:

a slave-destined information receiving unit for receiving information from said master-side port; and

a slave-destined information control unit for allowing output from said slave-destined information receiving unit according to a prespecified method; and

accumulates the general information or the specific information, when the general information or the specific information has been received from said master-side port, for a specified period of time decided by a period of time required

for transmission of the information with a specified length after input into said slave-destined information receiving unit is started, and

outputs the accumulated information from said slave-destined information receiving unit after passage of the specified period of time.

8. The communication network according to Claim 3; wherein said multiplexer comprises:

10 a slave-destined generation information receiving unit for receiving the general information from said master-side port;

a slave-destined specific information receiving unit for receiving the specific information from said master-side port; and

15 a slave-destined information selecting unit for selecting any one of said slave-destined general information receiving unit or said slave-destined receiving unit and allowing output to said slave devices according to a prespecified method; wherein

said multiplexer allows output from said slave-destined general information receiving unit when the specific information has not been received from said master-side port;

said multiplexer inhibits output of the specific information when the specific information has been received from the master-side port for a specified period of time decided by a time required for transmission of the information with a fixed

length after input to said slave-destined specific information receiving unit is started, and further

said multiplexer inhibits new output from said slave-destined general information receiving unit for the specified
5 period of time and allows output from said slave-destined specific information receiving unit after passage of the specified period of time.

9. The communication network according to Claim 8; wherein
10 said master device and each of said slave devices transmits management information with a fixed length to a target device at a predetermined cycle; and

said multiplexer further comprises:

a management information transreceiving unit for
15 transmitting or receiving the management information; and

said master-destined information selecting unit inhibits new output from said management information transreceiving unit for the specified period of time when the specified information has been received from any of said slave-side ports, and allows
20 output from said master-destined specific information receiving unit after passage of the specified period of time, and further

said slave-destined information selecting unit inhibits new output from the management information transreceiving unit for the specified period of time when the specific information
25 has been received from said master-side port, and allows output

from said slave-destined specific information receiving unit after passage of the specified period of time.

10. The communication network according to Claim 8; wherein,
5 out of all of said packet multiplexers at least one packet multiplexer is replaced with a second multiplexer constituting a small-scale communication network;

said at least one second multiplexer is connected via said multiplexer with said master device at the vertex, and one or
10 more multiplexers are connected to each of said second multiplexer according to necessity with a plurality of said slave devices connected thereto in a tree form; and

each of said second multiplexers does not relay the specific information, behaves as a slave device with respect to
15 a master device at an upper level, and also behaves as a master device with respect to each of the slave devices at a lower level;

said master device specifies said second multiplexer according to a round-robin, and each of said second multiplexer transmits the specific information for starting used for matching
20 the sampling time to said master device according to a specified order and executes a prespecified operation according to the specific information for returning returned from said second multiplexer in response to the specific information for starting to match the sampling time; and further

25 each of said second multiplexer specifies each of said

slave devices via said multiplexer according to a round-robin,
and each of said slave devices transmits information for starting
used for matching the sampling time to said second multiplexer
via said multiplexer according to the specified order and also
5 executes a specified operation according to the specific
information for returning returned from said second multiplexer
in response to the specific information for starting to match
the sampling time.

10 11. The communication network according to Claim 10; wherein
said second multiplexer comprises:

a master-side specific information transreceiving unit for
transmitting or receiving the specific information from said
master-side port in place of said master-destined specific
15 information receiving unit in said multiplexer; and

a slave-side specific information transreceiving unit for
transmitting or receiving the specific information from said
slave-side port in place of said slave-destined information
receiving unit in said multiplexer.

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12. The communication network according to Claim 11; wherein
said master-destined information selecting unit

inhibits output from said master-side specific information
transreceiving unit for the specified period of time when a
25 specific information sending request has been received from said

master-side specific information transreceiving unit; and

inhibits new output from said master-destined general information receiving unit for the specified period of time and allows output from said master-side specific information transreceiving unit after passage of the specified period of time; and

said slave-destined information selecting unit

inhibits output from said slave-side specific information transreceiving unit for the specified period of time when a specific information sending request has been received from said slave-side specific information transreceiving unit;

inhibits new output from said slave-destined general information receiving unit for the specified period of time and then allows output from said slave-side specific information transreceiving unit after passage of the specified period of time.

13. The communication network according to Claim 8; wherein, out of all of said packet multiplexers at least one packet multiplexer is replaced with a third multiplexer constituting a small-scale communication network;

at least one of said third multiplexers is connected thereto via said multiplexer with said master device at the vertex, and further a plurality of said slave devices are connected via said third multiplexer and one or more multiplexers according

to necessity in a tree form with a second master device functioning as a master device in the small-scale communication network provided at the vertex;

5 said master device specifies each of said slave devices via said multiplexer and said third multiplexer according to a round-robin, and each of said slave devices transmits the specific information for starting used for matching the sampling time to said master device according to the specified order, and executes a specified operation according to the specified
10 information for returning returned from said master device in response to the specific information for starting to match the sampling time.

14. The communication network according to Claim 13; wherein
15 said third multiplexer has a second master-side port for connecting said second master device thereto for mutual communications, and further comprises, in addition to components of the multiplexer,

a second master-side master-destined general information
20 receiving unit for receiving the general information from said second master-side port to said master-side port;

a second master-side slave-destined general information receiving unit for receiving the general information from said second master-side port to said slave-side port;

25 a master-side second master-destined general information

receiving unit for receiving the general information from said master-side port to said second master-side port;

a slave-side second master-destined general information receiving unit for receiving the general information from said slave-side port to the second master-side port;

a second master-destined information selecting unit for selecting any one of said master-side second master-destined general information receiving unit or said slave-side second master-destined general information receiving unit and allowing output therefrom; and

a second master-destined information multiplexing bus for outputting information allowed by said second master-destined information selecting unit to said second master-side port.

15. The communication network according to Claim 14; wherein said master-destined information selecting unit

inhibits outputs of the specified information for the specified period of time when the specific information has been received from any of said slave-side ports;

inhibits new output from said master-destined general information receiving unit as well as from said second master-side master-destined general information receiving unit for the specified period of time and allows output from said master-destined specific information receiving unit for passage of the specified period of time; and

said slave-destined information selecting unit
inhibits output of the specific information for the
specified period of time when the specific information has been
received from said master-side port;

5 inhibits new output from said slave-destined general
information receiving unit as well as from said second
master-side slave-destined general information receiving unit
for the specified period of time and allows output from the
slave-destined specific information receiving unit after passage
10 of the specified period of time; and

said second master-destined information selecting unit
allows output from said master-side second master-destined
general information receiving unit as well as from said
slave-side second master-destined general information receiving
15 unit according to a round-robin.

16. The communication network according to Claim 13; wherein,
in place of said master device, there are provided:

a switch for switching the general information;
20 a third master device for transmitting or receiving the
specified information; and

at least one fourth multiplexer connected to said switch;
and

said third master device specifies each of said slave
25 devices via said multiplexer, said fourth multiplexer, and said

third multiplexer according to a round-robin, and then each of said slave devices transmits the specific information for starting used for matching the sampling time to said master device according to a specified order and executes a specified operation according to the specific information for returning returned from said master device in response to the specific information for starting to match the sampling time.

17. The communication network according to Claim 16; wherein said fourth multiplexer has an switch-side port for connecting the switch thereto to relay mutual communications, and comprises:

a switch-destined general information receiving unit in place of said master-destined general information receiving unit for discretely receiving the general information from each of said slave-side ports;

a switch-side slave-destined general information receiving unit in place of said slave-destined general information receiving unit for receiving the general information from said switch-side port; and

a third master-destined information control unit for controlling said master-destined specific information receiving unit and allowing output to said third master device according to a specified method in place of said master-destined information selecting unit; and further comprises, in addition to components of the multiplexer,

a switch-destined information selecting unit for selecting one of said switch-destined information receiving units and allowing output therefrom.

5 18. The communication network according to Claim 17; wherein said master-destined information control unit

accumulates the specified information in said master-destined specific information receiving unit for the specified period of time when the specified information has been received from said slave-side port, and

10 outputs the specified information from said master-destined information receiving unit after passage of the specified period of time; and

said switch-destined information selecting unit allows 15 output from said switch-destined general receiving unit according to a round-robin; and

said slave-destined information selecting unit inhibits output from said slave-destined specific information receiving unit for the specified period of time when 20 the specific information has been received from said master-side port,

inhibits new output from said slave-destined general information receiving unit for the specified period of time, and

allows output from said slave-destined specific 25 information receiving unit after passage of the specified period

of time.

19. The communication network according to Claim 13; wherein, in place of said master device, there are provided:

5 a switch for switching the general information and the specific information; and

a third master device for transmitting or receiving the specific information; and

10 said third master device specifies each of said slave devices via said switch, said multiplexer, and said third multiplexer according to a round-robin, and then each of said slave devices transmits specific information for starting used for matching the sampling time to said master device and executes a specified operation according to the specific information for
15 returning returned from said master device according to the specific information for starting to match the sampling time.

20. The communication network according to Claim 19; wherein said switch comprises a switching unit for outputting information
20 allowed by said master-destined information control unit to a slave-side port as an destination in place of said a slave-destined general information receiving unit, said master-side second master-destined general information receiving unit, said second master-side master-destined general information
25 receiving unit, said second master-side slave-destined general

information receiving unit, said master-destined general
information receiving unit, said second master-side port, said
broadcasting bus, said multiplexing bus, and said second
master-destined information multiplexing bus in said third
5 multiplexer.

21. The communication network according to Claim 20; wherein
said master-destined information control unit

accumulates the specified information in said master-
10 destined specific information receiving unit for the specified
period of time when the specified information has been received
from said slave-side port and outputs the specific information
from said master-destined specific information receiving unit
after passage of the specified period of time; and said second
15 master-destined information selecting unit

inhibits output from said slave-destined specific
information receiving unit for the specified period of then when
the specific information has been received from said master-
side port;

20 inhibits new output from said second master-destined
general information receiving unit for the specified period of
time and allows output from said slave-destined specific
information receiving unit after passage of the specified period
of time.

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22. The communication network according to Claim 1; wherein
information transmitted from or received by each device is
variable in the length, and

in this case, the specified period of time during which
5 output of the specific information from each device is inhibited
is restricted within a time frame decided by a time prespecified
for transmitting information with the maximum length.